REMARKS

Claims 1, 4, 5, 7, 19 and 20 are pending. By this Amendment, the drawings are corrected pursuant to the attached drawing sheet, claims 2, 3, 6 and 8-18 are cancelled without prejudice to or disclaimer of the subject matter contained therein, the specification and claims 1 and 5 are amended, and claims 19 and 20 are added. Claim 1 is amended to recite features supported in the specification on page 20, lines 2-6, incorporating the features of claims 2 and 3. Claim 5 is similarly amended and to incorporate the features of claim 6. Claims 19 and 20 are added to recite features supported in the specification at page 22, lines 22-25 and Figs. 8 and 9. No new matter is added by any of these amendments.

Applicants appreciate the courtesies extended to Applicants' representative by Examiner Hassanzadeh during the July 11, 2003 personal interview, and the July 22 and August 13, 2003 telephone interviews. In accordance with MPEP §713.04, the points discussed during the interviews are incorporated in the remarks below and constitute Applicants' record of the interviews.

Reconsideration based on the following remarks is respectfully requested.

I. Claim 1 Satisfies the Requirements under 35 U.S.C. §112, second paragraph

Claim 1 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Claim 1 was amended in the March 21, 2003 Amendment to obviate this rejection. Specifically, "excitation wavelength" was replaced with --a wavelength of a supplied high frequency power--. Withdrawal of the rejection under 35 U.S.C. §112, second paragraph is respectfully requested.

II. Claims 1, 4, 5, 7, 19 and 20 Define Patentable Subject Matter

The Final Office Action rejects claims 1-3, 5 and 6 under 35 U.S.C. §103(a) over U.S. Patent 5,558,718 to Leung in view of Japanese Patent JP 08-299785A to Nawata *et al.* (Nawata). The Final Office Action further rejects claims 1-7 under 35 U.S.C. §103(a) over

U.S. Patent 5,795,492 to Kinoshita *et al.* (Kinoshita) in view of Leung and Nawata. These rejections are respectfully traversed with respect to claims 1, 4, 5 and 7, and rendered moot with respect to claims 2, 3 and 6.

Claims 1 and 5 are amended. Leung, Nawata and Kinoshita, alone or in any combination, do not teach or suggest a plasma processing apparatus provided with an inductive coupled electrode for generating plasma in a vacuum processing chamber, wherein the electrode is formed by a conductive line-shaped member whose total length is substantially equal to a wavelength of a supplied high frequency power, and is formed so that one end of the electrode is grounded and another end thereof is connected to a high frequency power source for supplying the high frequency power, a standing wave of one wavelength is produced along the electrode when the high frequency power source supplies the high frequency power to the electrode, a node of the standing wave produced along the electrode is formed at a central portion of the electrode, and an antinode of the standing wave is formed on both portions respectively corresponding to a half portion of the electrode, which exist at both sides of the center point, wherein said electrode is formed to be U-shaped by having a bent-back portion at said central portion, each of the half portions of said electrode corresponds to a straight portion, both of the half portions are arranged in parallel, and a length of the half portion of said electrode is substantially equal to a half of the wavelength of said high frequency power, and the length of the half portion of said electrode is about one order of magnitude longer than a width between the half portions, as recited in claim 1.

Further the applied references fail to teach or suggest an inductive coupled electrode said electrode is formed so that total length is determined to natural number times of a half of a wavelength of a supplied high frequency power, and is formed so that one end of said electrode is grounded and another end thereof is connected to a high frequency power source for supplying said high frequency power, and standing waves are produced along said

electrode when said high frequency power source supplies said high frequency to said electrode, and a node of said standing waves produced along said electrode is formed at a central portion of said electrode, and at least one antinode of said standing waves is formed on both portions respectively corresponding to a half portion of said electrode, which existing at both sides of said center point, wherein said electrode is formed to be U-shaped by having a bent-back portion at said central portion, each of the half portions of said electrode is a straight portion, both of the half portions are arranged in parallel, said node of said standing wave is consistent with a bending back point, and the length of the half portion of said electrode is about one order of magnitude longer than a width between the half portions, as recited in claim 5.

Instead, Leung discloses a vacuum chamber having a pulsed plasma source 10. Leung further teaches the pulse plasma source 10 as having a partially coil shape arranged around the target object 11 placed inside the chamber walls 14. A pulse current is supplied into the pulsed plasma source 10 from the RF pulse circuit to expose the target object 11 to the plasma in a pulse mode. See col. 5, lines 2-32 and Fig. 2C of Leung. The plasma pulse source of Leung cannot be considered analogous to the high frequency power source of Applicants' claimed features.

Because the pulse plasma source 10 shown in Leung is not grounded, the Final Office Action also applies Nawata as an additional reference. Nawata discloses a discharge reactor. The Office Action asserts that the plasma processing apparatus of Nawata has a plurality of electrodes, that these electrodes are connected to the RF power source, and that the ends of the electrodes are grounded. Applicants respectfully disagree, and assert that the discharge reactor in Nawata merely shows just parallel-planar electrode structure.

Further, there is no motivation to combine features related to the ion implantation apparatus of Leung with the discharge reactor of Nawata, nor has the Final Office Action

established sufficient motivation or a *prima facie* case of obviousness. Even assuming that motivation to combine Leung and Nawata is established, the combination fails to teach or suggest Applicants' claimed features.

Kinoshita does not compensate for the deficiencies of Leung outlined above for claims 1 and 5. Nor does Kinoshita teach, disclose or suggest the additional features recited in claims 4 amd 7. Instead, Kinoshita discloses a dry process system having a chamber 1 with reaction gas 4. In particular, Kinoshita teaches at least one pair of planar electrodes 21, 22 arranged inside the chamber 1 in parallel. A substrate 3 is loaded on the electrodes that are supplied with an alternating current power source 6 through a predetermined electric element, *e.g.*, a blocking capacitor 7 and a means for applying one or more magnetic fields 21. See col. 5, lines 46-62 and Fig. 1 of Kinoshita. Applicants assert that Kinoshita merely shows a structure forming the layered parallel-planar electrodes.

The subject matter defined by Applicants' claims relates to a plasma processing apparatus based on the plasma CVD for uniformly depositing the amorphous thin film onto the large-area rectangular substrate etc. using the inductive coupled electrode in order to make a solar cell. The claimed features recite that the electrodes arranged in the chamber is formed by bending the conductive wire or the conductive line-shaped member back at its central portion to make a substantially U-shape member. See, *e.g.*, page 12 of the specification and Figs. 4 and 5. The electrodes having such a characteristic shape are arranged at the predetermined arrangement to the substrate conveyed in the chamber, and the predetermined high frequency power is supplied to the electrodes from the high frequency power source in order to produce the standing wave with the predetermined pattern along each of the electrodes. These features are not taught or suggested by any of the applied references.

Also, there is no motivation to combine features related to the dry process system of Kinoshita with the ion implantation apparatus of Leung. Nor has the Final Office Action established sufficient motivation or a *prima facie* case of obviousness. Even assuming that motivation to combine Kinoshita and Leung is established, the combination fails to teach or suggest Applicants' claimed features.

Additionally, claim 19 recites an electrode having a total length substantially equal to a wavelength (L) of a high frequency power (E) with one end grounded (A) and another end connected to a power source (D). Claim 19 further recites the electrode being U-shaped with half-portions (A-B, C-D) substantially equal to half of the wavelength (L/2), arranged in parallel, and about one order of magnitude longer than the bent-back portion. This argument applies by extension to claim 20 by its dependence from claim 19.

For at least these reasons, Applicants respectfully assert that the claims are now patentable over the applied references and are consequently in condition for allowance. Thus, Applicants respectfully request that the rejections under 35 U.S.C. §103 be withdrawn.

III. Conclusion

In view of the foregoing, Applicants respectfully submit that this application is in condition for allowance. Favorable consideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,

James A. Oliff
Registration No. 27,075

Gerhard W. Thielman
Registration No. 43,186

JAO:GWT/gwt

Attachment:
Petition for Extension of Time

Date: September 16, 2003

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry;
Charge any fee due to our Deposit Account No. 15-0461

Amendments to the Specification:

IN THE SPECIFICATION:

Please replace the paragraph at page 22, lines 22-25 with the following rewritten paragraph:

~~Since~~ Because the dielectric constant of the plasma differs depending on the discharge conditions, the determination of the frequency is extremely difficult. Therefore, in practice, the optimal discharge frequency is determined by experiments. Additionally, Figs. 8 and 9 show the electrode length L and half-length L/2 in relation to a sinusoidal waveform E. In Fig. 8, the waveform E and the electrode begins at ground potential, located at A to the beginning of the bent-back portion B of the electrode near the node. The waveform E continues to the end of the bent-back portion C to terminate at the power source located at D. Thus, the electrode extends from the ground to power source locations A to D to length L. In Fig. 9, the length from A to B and from C to D extends about a half-length L/2, such that the distance from A to B and from C to B is much greater than the distance from B to C.

IN THE CLAIMS:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) In a plasma processing apparatus provided with an inductive coupled electrode for generating plasma in a vacuum processing chamber, the plasma processing apparatus wherein:

said electrode is formed ~~by a conductive line-shaped member whose~~ so that total length thereof is substantially equal to a wavelength of a supplied high frequency power, and is formed so that;

one end of said electrode is grounded and another end thereof is connected to a high frequency power source for supplying said high frequency power, and a standing wave of one wavelength is produced along said electrode when said high frequency power source supplies said high frequency power to said electrode; and

a node of said standing wave produced along said electrode is formed at a central portion of said electrode, and an antinode of said standing wave is formed on both portions respectively corresponding to a half portion of said electrode, which exist at both sides of said center point, wherein

said electrode is formed to be U-shaped by having a bent-back portion at said central portion,

each of the half portions of said electrode corresponds to a straight portion,

both of the half portions are arranged in parallel, and a length of the half portion of said electrode is substantially equal to a half of the wavelength of said high frequency power, and

the length of the half portion of said electrode is about one order of magnitude longer than a width between the half portions.

2. (Cancelled)

3. (Cancelled)

4. (Previously Presented) A plasma processing apparatus as set forth in claim 1, wherein a plurality of said electrodes are arranged to make a stratified structure comprising a plurality of layers within said vacuum processing chamber, a plurality of film depositing regions are produced using a space between said electrodes included in said plurality of layers, and film deposition on a substrate is performed in each of said plurality of film depositing regions.

5. (Currently Amended) In a plasma processing apparatus provided with an inductive coupled electrode for generating plasma in a vacuum processing chamber, the plasma processing apparatus wherein:

said electrode is formed ~~by a conductive line-shaped member whose~~ so that total length is determined to natural number times of a half of a wavelength of a supplied high frequency power, and is formed so that;

one end of said electrode is grounded and another end thereof is connected to a high frequency power source for supplying said high frequency power, and standing waves are produced along said electrode when said high frequency power source supplies said high frequency to said electrode; and

a node of said standing waves produced along said electrode is formed at a central portion of said electrode, and at least one antinode of said standing waves is formed on both portions respectively corresponding to a half portion of said electrode, which existing at both sides of said center point, wherein

said electrode is formed to be U-shaped by having a bent-back portion at said central portion,

each of the half portions of said electrode is a straight portion, both of the half portions are arranged in parallel,

said node of said standing wave is consistent with a bending back point, and

the length of the half portion of said electrode is about one order of magnitude longer than a width between the half portions.

6. (Cancelled)

7. (Previously Presented) A plasma processing apparatus as set forth in claim 5, wherein a plurality of said electrodes are arranged to make a stratified structure comprising a plurality of layers within said vacuum processing chamber, a plurality of film depositing regions are produced using a space between said electrodes included in said plurality of layers, and film deposition on a substrate is performed in each of said plurality of film depositing regions.

8-18. (Cancelled)

19. (New) In a plasma processing apparatus provided with an inductive coupled electrode for generating plasma in a vacuum processing chamber, the plasma processing apparatus, wherein:

total length of said electrode is substantially equal to a wavelength of a supplied high frequency power;

one end of said electrode is grounded and another end is connected to a high frequency power source;

said electrode is formed to be U-shaped so that a central portion of the total length thereof is a bent-back portion, with about half-portions on either side of said bent-back portion;

each of the about half-portions of said electrode is a straight portion;

the length of each straight portion is substantially equal to a half of the wavelength of the high frequency power supplied to said electrode;

the straight portions are arranged in parallel; and

the length of the about half-portions of said electrode is about one order of magnitude longer than the bent-back portion.

20. (New) A plasma processing apparatus according to claim 8, wherein the length of said electrode is a natural number times a half of the wavelength of the supplied frequency power.

IN THE DRAWINGS:

The attached sheet of drawings includes additions to Figs. 8 and 9. This sheet includes added Figs. 8 and 9.

Attachment: Additional Sheet: Figs. 8 and 9